

Claims

- [c1] 1) A hinge device (12) for a rotary member (11) of an air-craft engine (1) comprising a conduit (3) housing said rotary member (11) and for conducting a stream of gas, and an external environment (9) outside said conduit (3) and for receiving a cooling fluid having, in use, a higher pressure than the stream of gas in said conduit (3); the hinge device comprising a hinge seat (18) formed in a supporting structure (6) interposed between said external environment (9) and said conduit (3); a hinge pin (16) integral with said rotary member (11) and engaging said hinge seat (18) to rotate about an axis (15); and a cooling passage (42) having an inlet (43) which comes out inside said external environment (9), and an outlet (44) which comes out inside said conduit (3) to cool at least said hinge pin (16) by means of a stream of said cooling fluid; characterized in that said cooling passage (42) comprises at least one number of channels (46, 48, 50, 56, 60) formed outside said hinge pin (16) and distributed angularly about said axis (15).
- [c2] 2) A hinge device as claimed in Claim 1, characterized in that said cooling passage (42) is formed entirely outside

said hinge pin (16).

- [c3] 3) A hinge device as claimed in Claim 1, characterized by also comprising a collar portion (33) fitted about said hinge pin (16); said cooling passage (42) comprising at least one cooling fluid calibration channel (46) formed at least partly on said collar portion (33) in an intermediate position between said inlet (43) and said hinge pin (16).
- [c4] 4) A hinge device as claimed in Claim 3, characterized in that said cooling passage (42) comprises a first number of channels (46, 48, 50) distributed about said axis (15) and formed at least partly on said collar portion (33).
- [c5] 5) A hinge device as claimed in Claim 4, characterized in that the channels in said first number of channels (46, 48, 50) comprise respective grooves (47, 49, 51) formed on an outer surface (36, 35, 37) of said collar portion (33).
- [c6] 6) A hinge device as claimed in Claim 5, characterized in that said collar portion (33) comprises an annular surface (35) fitted to said hinge pin (16) with substantially no radial slack; said grooves (49) being formed axially on said annular surface (35).
- [c7] 7) A hinge device as claimed in Claim 6, characterized in that said collar portion (33) comprises an end surface

(36, 37) extending from said annular surface (35) and crosswise to said axis (15); said cooling passage (42) also comprising a second number of channels (46, 50), each comprising a relative groove (47, 51) formed on said end surface (36, 37).

[c8] 8) A hinge device as claimed in Claim 7, characterized in that said cooling passage (42) also comprises a first annular chamber (52) formed between said first and said second number of channels (46)(48) to distribute said stream of cooling fluid.

[c9] 9) A hinge device as claimed in Claim 8, characterized in that said first annular chamber (52) is defined partly by a bevel (38) between said annular surface (35) and said end surface (36).

[c10] 10) A hinge device as claimed in Claim 1, characterized in that said cooling passage (42) comprises a third number of channels (56, 60) formed at least partly on said hinge pin (16) and distributed angularly about said axis (15).

[c11] 11) A hinge device as claimed in Claim 10, characterized in that the channels in said third number of channels (56, 60) comprise respective recesses (57, 61; 57a, 61a) formed on an outer surface (23, 25a) of said hinge pin

(16).

- [c12] 12) A hinge device as claimed in Claim 11, characterized in that said recesses (57a, 61a) slope with respect to an axial or radial direction.
- [c13] 13) A hinge device as claimed in Claim 11, characterized in that said recesses (57a, 61a) intersect one another.
- [c14] 14) A hinge device as claimed in Claim 11, characterized in that said cooling passage (42) also comprises a second annular chamber (59) formed upstream from said recesses (57, 61) to distribute said stream of cooling fluid.
- [c15] 15) A hinge device as claimed in Claim 14, characterized in that said hinge pin (16) comprises an outer shoulder (25) crosswise to said axis (15) and engaging said hinge seat (18) in rotary manner; said second annular chamber (59) comprising an annular groove (58) formed on said shoulder (25).
- [c16] 16) A hinge device as claimed in Claim 11, characterized in that said outer surface (23, 25a) of said hinge pin (16) is connected in sliding manner to said supporting structure (6) to rotate about said axis (15); said third number of channels (56, 60) coming out inside said conduit (3) through said outlet (44).

- [c17] 17) A hinge device as claimed in Claim 1, characterized in that said channels (46, 48, 50, 56, 60) are equally spaced angularly about said axis (15).
- [c18] 18) A hinge device as claimed in Claim 1, characterized in that said hinge pin (16) comprises a cylindrical outer surface (23) connected in sliding manner to said supporting structure (6) to rotate about said axis (15); a guide surface (21) for guiding the stream of gas and bounding a portion of said conduit (3); and guide means (62) for guiding said cooling fluid and interposed between said cylindrical outer surface (23) and said guide surface (21) to direct a film of cooling fluid from said cooling passage (42) on to the guide surface (21).
- [c19] 19) A hinge device as claimed in Claim 18, characterized in that said guide means comprise a radiused annular portion (62) formed between said guide surface (21) and said cylindrical outer surface (23) and at least partly defining said outlet (44).
- [c20] 20) A hinge device as claimed in Claim 1, characterized in that said rotary member is a stator blade (11) of said aircraft engine (1).
- [c21] 21) A hinge device as claimed in Claim 1, characterized in that said collar portion (33) forms part of an actuating

lever (13) of said rotary member (11).